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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,367	09/30/2003	Satoshi Tanaka	914-174	4344

23117 7590 01/17/2007
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EXAMINER

TRINH, THANH TRUC

ART UNIT	PAPER NUMBER
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1753

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/17/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/673,367

Applicant(s)

TANAKA ET AL.

Examiner

Thanh-Truc Trinh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 8-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 9/30/2003.
- 4) ☒ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-7, drawn to a product, classified in class 136, subclass 243.
 - II. Claims 8-10, drawn to a method, classified in class 438, subclass 48.
 - III. Claims 11-14, drawn to different products, classified in class 136, subclass 256.

The inventions are distinct, each from the other because of the following reasons:

Inventions I, II and III are related as process of making and products made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by different methods such as electroplating.

Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

During a telephone conversation with the Applicant's representative, Mr. H. Warren Burnam, Jr., on 12/14/06 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-7. Affirmation of this election must be

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made by applicant in replying to this Office action. Invention of Group II and III are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Application is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagahara et al (US Patent 4737197) in view of Moon et al (US Patent 5980822).

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Regarding claims 1-3, Nagahara et al disclose a solar cell having an electrode, or contact 4, coated with solder 5. (See Figure 1 or col. 2 lines 15-18).

Nagahara et al do not teach using lead-free solder, nor do they teach using Sn-Bi-Ag based solder and including phosphorus in the solder.

Moon et al teach including phosphorus in the lead-free solder. (See Abstract).

Moon et al describe the mass percent of phosphorus in the lead-free solder is from 0.001 to 0.01, which is well within the claimed range of 0.00001 to 0.5. (See Abstract)

Moon et al disclose the lead-free solder containing Tin (Sn), Bismuth (Bi), Silver (Ag). (See Abstract)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the photovoltaic device of Nagahara et al by using lead-free solder containing phosphorus as taught by Moon et al, because it would eliminate poisonous lead and prevent formation of metal oxide substance to improve the result of soldering by reducing the source of poor soldering. (See '822 col. 1 lines 51-53, col. 2 lines 49-61)

Regarding claim 4, Nagahara et al describe firing silver paste to form the electrode. (See col. 3 lines 23-25)

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4. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagahara et al and Moon et al as applied to claims 1-4 above and further in view of Yoshida et al (US Patent 4256513)

Nagahara et al and Moon et al disclose a solar cell as described in section 3.

Neither Nagahara et al nor Moon et al describe the average grain size of 11 μm at most and mass % of powdery glass included in the silver paste, nor do they teach the average thickness of the silver paste of at least 15 μm .

Regarding claim 5, Yoshida et al teach using glass grain size of smaller than 1 μm , which is well within the claimed range of 11 μm at most. (See col. 6 lines 33-36)

Regarding claim 6, Yoshida et al teach using 1-10% by weight of glass (See table 1), and preferably 7-9% by weight of glass, which is well within the claimed range of 2.8-10.0 mass %. (See col. 11 lines 13-14).

Regarding claim 7, Yoshida et al teach that electrode thickness can be larger than 100 μm , which is well within the claimed range of at least 15 μm . (See col. 14 lines 1-5)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the solar cell of Nagahara et al and Moon et al by having glass powdery grain size of smaller than 1 μm , glass powdery mass percent of 7-9%, electrode thickness of greater than 100 μm as taught by Yoshida et al, because it would improve the photoelectric conversion device by giving excellent output performance. (See '513 col. 18 lines 34-37 and lines 55-59)

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Conclusion

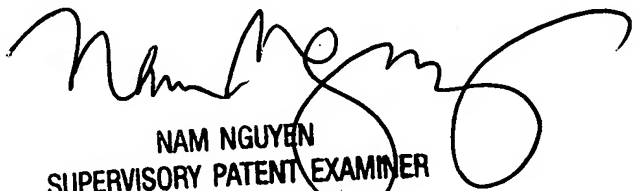
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: US Patent 5428249.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh-Truc Trinh whose telephone number is 571-272-6594. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TT
12/26/2006


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